

Astylospongia, F. Römer. Silurian.

Palæomanon, F. Römer. Silurian.

Protachilleum, Zitt. Silurian.

? *Eospongia*, Billings.

Melonella, Zitt. Upper Jura.

Cylindrophyma, Zitt. Upper Jura.

Mastosia, Zitt. Upper Jura and Neocomian.

Vetulina, O. Schm. Recent.

XXXVI.—*Contributions towards a General History of the Marine Polyzoa.* By the Rev. THOMAS HINCKS, B.A., F.R.S.

[Continued from vol. xiii. p. 369.]

[Plates VIII. & IX.]

XIII. POLYZOA FROM VICTORIA (*continued*).

Family Cellulariidæ.

MENIPEA, Lamouroux.

Menipea marginata, n. sp. (Pl. IX. fig. 1.)

Zoarium dichotomously branched; branches stout, of considerable width, expanding upwards, with a marginal rib, formed of many tubes closely appressed to one another, which are given off from the dorsal surface. *Zoecia* disposed in 5-7 longitudinal series, alternate, contracted above, expanded below; front wall wholly membranous (no calcareous expansion), margin thin, on the outer edge above three or four tall and stout spines, on the inner two; an operculum springing from the inner side, a short distance below the top of the cell, expanded above, bilobed, and deeply sinuated on the upper margin, placed edgewise; at the bottom of each cell, on one side or both, a small *avicularium* with triangular mandible; the marginal cells larger than the rest and bearing gigantic spines, which form a conspicuous line along the edge of the zoarium (Pl. IX. fig. 1 *b*); below each of these cells a distinct area, on which is placed a very large *avicularium* resembling in many points the articulated avicularium of *Bugula*, but sessile and fixed, the basal region well rounded, the mandibular portion turned upwards, beak strongly uncinatè, mandible pointed. *Dorsal surface* flat, the cells showing as fusiform areas; between each pair of marginal zoecia a small rising from which a chitinous tube originates, which unites with the marginal

rib. *Occium* terminal, galeate, flattish in front, surrounded by a thickened line, somewhat elongate, rounded or subacuminate above, surface smooth.

Loc. Port Phillip Heads (*J. B. Wilson*).

In this remarkable species there are none of the lateral appendages which are so common amongst the members of the genus *Menipea*. They are replaced by the large avicularia, which are intercalated between the marginal cells and form a conspicuous line along the whole length of the branch. These are fixed and destitute of a peduncle; but the conformation of the anterior or mandibular region approaches very closely to that which we have in *Bugula*, and we cannot fail to recognize in the avicularium of the present species a transition form leading on to the articulated type. The modification of the marginal cells is another interesting peculiarity; they are very much larger than the rest and support an array of spines of corresponding size. Another character which deserves notice is the marginal rib which edges the zoarium through its entire extent, composed of the tubular fibres, which play so important a part and discharge so many functions in the economy of the Polyzoa; they are given off from a small swelling placed on the dorsal surface between the marginal zoecia, which probably represents the vibracular or avicularian cell of other forms. This rib exists in many Polyzoa belonging to very different families and was employed by Gray as the distinctive character of his genus *Flustramorpha*, a purely artificial group.

Family Membraniporidae.

FARCIMINARIA, Busk.

Farciminaria uncinata, n. sp. (Pl. VIII. fig. 2.)

Zoarium dichotomously branched, stems and branches slender, four-sided. *Zoecia* disposed in four longitudinal series, elongate, rounded at the top, widest above and narrowing gradually towards the base; margin thin, not much raised, usually a small acuminate spine on each side above; front wall membranous, semitransparent, more or less covered with minute disks, strongly lined transversely just below the orifice, which is at the very top of the area; on each side, immediately within the margin and extending for some way down the cell, a hollow structure, sac-like in form, supporting towards its upper extremity a strongly pointed uncinuate process (or spine) which projects at the side of the oral valve. *Occium* very large and prominent, covering about half of the cell, rounded above, flattened in front, and much de-

pressed towards the very wide and shallow oral arch ; surface smooth, divided into distinct areas by raised partitions. Grows in rather large tufts, which are rooted by a trunk-like mass of tubular fibres.

It is difficult, in the absence of living specimens, to form a conjecture respecting the function of the urcinate processes on each side of the cell. They are clearly not to be placed in the same category as the ordinary spines, for they exhibit a very distinctive structure, which points to some special function. Each of them is connected with a small sac-like structure, which lies close alongside the margin of the cell between the outer wall and the perigastric cavity. The front wall of the sac rises and becomes somewhat inflated towards the upper extremity, and from this portion the sharp, slightly curved spine springs, extending usually to the base of the oral valve or a little above it.

The genus *Farciminaria* is allied, through the structure of its cell, to the Membraniporidae, from the ordinary type of which it is only distinguishable by its habit of growth and its simply chitinous zoëcium. These differences have little systematic value, and have no claim to be made the criteria of a natural division ; but it may be convenient to range the forms which exhibit them as a kind of subgroup of the Membraniporidan family.

MEMBRANIPORA, De Blainville.

Membranipora perfragilis, MacGillivray (sp.).

Bifustra perfragilis, MacG. Nat. Hist. of Victoria, Decade vi. p. 27, pl. 57. fig. 1.

In his account of this species MacGillivray takes no notice of the avicularium, and I therefore supply a description and figure of it (Pl. VIII. fig. 4).

Avicularian cell very narrow, as compared with the ordinary cells, elongate, with a calcareous expansion at the bottom as in the latter ; the lower third of the aperture closed in by a membranous wall, the rest occupied by a large horny operculum working on a distinct hinge, slightly hollowed at the sides and rounded above (subspatulate), the margin of the cell a good deal raised round the operculum, and somewhat expanded and bent inwards at the points where the sides of the latter are hollowed out.

The avicularium of this species is an interesting transition form, showing very clearly the morphological relation of the appendages to the normal zoëcium. It is not very freely developed in the specimens which I have examined.

I have not followed MacGillivray in referring the present

species to *Biflustra*, as I am unable to find any valid distinction between that genus and *Membranipora*.

Family Cribrilinidæ.

CRIBRILINA, Gray.

Cribrilina monoceros, MacGillivray. (Pl. VIII. fig. 5.)

I have figured a very young colony of this species from Port Phillip Heads, which exhibits in its perfect simplicity a striking contrast to the adult condition. The mature cell is remarkable for the number and variety of the appendages with which it is furnished.

Family Porinidæ.

PORINA, D'Orbigny.

Porina magnirostris, MacGillivray (sp.).

(Pl. IX. fig. 6.)

Lepralia magnirostris, MacG. Proc. Royal Soc. Victoria, 1882, "Descriptions of new or little-known Polyzoa," part ii.

I cannot hesitate, looking to the many points of similarity between the two forms, to identify MacGillivray's *Lepralia magnirostris* with a *Porina* which occurs abundantly amongst Mr. Wilson's dredgings. He does not note the characteristic "special pore," but in other particulars there is complete agreement. The habit is Hemescharine, and the celliferous lamina is very stout and strong; it is twisted and sinuated and forms large chambered masses of a yellowish-brown colour. The pore is sometimes placed a good way down the cell, sometimes it is much nearer the orifice; it is raised and tubular. The whole zoarium is usually covered with an epidermal investment, which renders it difficult to make out the structure. The figure represents a young marginal cell and the avicularium of the cell below it.

Family Cyclicoporidæ.

Zoæcia having the front wall wholly calcified and destitute of raised margins or depressed area, with a more or less orbicular orifice.

CYCLICOPORA, n. gen.

Generic character.—*Zoæcia* with a perfectly simple orifice more or less orbicular. *Zoarium* (in the only known species) incrusting.

Cyclicopora prælonga, n. sp. (Pl. IX. fig. 7.)

Zoæcia (usually) of great length and of about equal width

throughout, disposed in linear series; front wall epressed, almost flat, rising slightly towards the orifice, sutures little more than incised lines; surface smooth, of greyish colour, covered with punctures, which are commonly almost concealed by a shining membranous epidermis; orifice nearly circular (somewhat drawn out transversely); peristome very slightly thickened and raised, unarmed, forming a delicate rim. *Avicularia* none. *Oæcium* large, rounded, prominent, somewhat produced lengthways; surface punctured and roughened, glossy, the punctures often almost obliterated.

Zoarium of very delicate texture, forming a greyish glossy crust, on the flat surface of which the orifices show as slight elevations.

Loc. Port Phillip Heads (*J. B. Wilson*).

In this species the structure is perfectly simple; there are no appendages. The orifice is all but circular, without sinus or secondary opening. It seems entitled to stand as the type of a new group.

Family Myrizoidæ (part.), Smitt.

SCHIZOPORELLA, Hincks.

Schizoporella subsinuata, n. sp. (Pl. VIII. fig. 1.)

Zoarium incrusting, of a dark greyish colour. *Zoecia* ovate, quincuncial, bounded by raised lines, moderately convex, rising considerably towards the oral region (frequently a prominent nodulated boss immediately below the orifice), depressed below; surface thickly punctured and roughened by many nodules; orifice arched above, broader than high, lower margin straight, with a very minute central notch-like sinus; operculum of a dark reddish colour. *Avicularia* none. *Oæcium* large and massive, covering great part of the cell above, rounded, prominent, with the surface roughened and punctured.

The zoecia are often invested with a thin papyraceous covering.

Loc. Port Phillip Heads (*J. B. Wilson*).

Schizoporella biturrita, n. sp. (Pl. IX. fig. 8.)

Zoecia ovate, boundaries indistinct, very moderately convex, depressed towards the base, quincuncially arranged; surface thickly covered with rather large punctures, and with nodular risings amongst them, usually invested by a smooth and dense covering, which conceals the pores, the nodules only showing faintly through it; orifice much taller than broad, arched above, the lower margin, with the exception of

a very small segment on each side, occupied by a deep bluntly-pointed sinus; peristome not elevated, unarmed; on each side of the orifice a tall, stout, tower-like process, bearing either at the back (usually) or on one side a large erect *avicularium*, extending from the base to the top of it; mandible broad and triangular below, slender and much produced above, directed upward. *Oæcium* gigantic, suborbicular, extending almost to the orifice of the cell above, the surface sloping down gradually on all sides from the elevated centre to the base (in the centre commonly a very prominent smooth umbo), thickly punctured and nodulated, the punctures generally concealed more or less by the smooth superficial investment; the two aviculiferous processes projecting one on each side in front of the ovicell.

Zoarium of a rather light yellowish-brown colour, incrusting a seaweed, and sending off free bilaminate expansions, short and broad, at intervals, which have a tendency to arrange themselves in whorls.

Loc. Port Phillip Heads (*J. B. Wilson*).

The tower-like processes constitute the striking feature of this species; they roughen the surface and give a scabrous appearance to the crust. Occasionally the avicularium is absent. The lower portion of the processes is invested by the superficial covering, which spreads over a great part of the zoarium; but it does not extend to the smooth and polished apex.

Schizoporella insignis, MacGillivray.

Schizoporella insignis, MacGillivray, Proc. Roy. Soc. Victoria, 1882.

Under this name MacGillivray has described a species which he had obtained off Port Phillip Heads, and which also occurs amongst Mr. Wilson's dredgings. It seems to me to be identical with *Schizoporella conservata*, Waters, a Tertiary fossil from South-west Victoria. I have recorded the occurrence of this form in Australia as a recent species ('Annals' for August 1882). In any case the name *insignis* could not be retained, as it had already been conferred on an African species ("Contributions" &c. 'Annals' for August 1881).

Family Escharidæ (part.), Smitt.

LEPRALIA, Johnston (part.).

Lepralia bifrons, n. sp. (Pl. VIII. fig. 3.)

Zoocia elongate, subrectangular, quincuncially arranged,

bounded by thick and conspicuous raised lines; surface flattish (sutures very shallow), punctured; orifice (primary) arched above, constricted by a prominent projection on each side, a short distance above the lower margin, which is slightly curved outwards; peristome elevated, especially at the back and sides (forming a raised rim), in front rather broad and somewhat flattened, unarmed; operculum smooth and polished, narrow (not so wide as the orifice), the space between it and the margin filled in by a horny plate, slightly hollowed out at the sides a little above the inferior margin. *Oæcium* large, suborbicular (rather broader than high), very moderately convex, punctured, a raised line round the base, within which there is a row of larger pores; peristome carried across the front of the ovicell, often rising into a projection on each side of the orifice. Immediately under the lower margin (in the oœcial cells) a large *avicularium*, broadly spatulate, short, contracted at the base, the mandibular portion much expanded and rounded anteriorly, mandible directed downwards; the space behind the mandible marked off by a very prominent denticular process on each side.

Loc. Port Phillip Heads (*J. B. Wilson*).

A curious peculiarity in this species is the want of correspondence in size between the orifice and the operculum. The latter is very narrow, and there is a space between it and the margin which is filled in by a delicate chitinous expansion. A distinct depression or furrow runs across the operculum in the line of the lateral denticles, and marks the hinge on which the movable valve works. The denticles are unusually large and prominent.

Avicularia seem to be altogether wanting on the cells which are not furnished with oœcia. On those which bear oœcia they are present and exhibit a very distinctive form and structure. They originate immediately under the lower margin of the orifice, and occupy a large portion of the area of the cell. The mandible is short and unusually broad and suborbicular in shape.

In most other cases the chamber or basal portion of the appendage is separated from the mandible by a partition, on which the latter works; but here two large denticles constitute the supports on which the valve moves, corresponding with those which occur in the orifice of the cell. The avicularium without its mandible resembles very markedly the orifice without its operculum *reversed*.

SMITTIA, Hincks.

Smittia reticulata, J. MacGillivray, var.
(Pl. IX. fig. 2.)

The variety of this species in which the avicularium is much elongated, with a slender mandible rounded at the extremity and placed on one side of the sinus, and often at some distance from it, instead of immediately under it, has been noticed in a previous portion of this series ('Annals' for August 1881). I now add a figure of it. Occasionally the avicularium is placed diagonally (as represented); more commonly it is straight. I am inclined to think that this form may be identical with *S. reticulata*, var. *ophidianu*, noticed by Waters in his 'Bryozoa of the Bay of Naples' (1879).

This species has a very wide range of distribution.

Smittia Landsborovii, Johnston, form *personata*.
(Pl. IX. figs. 3', 3.)

A variety of this species occurs amongst Mr. Wilson's dredgings in which the cells bearing oœcia exhibit a curious peculiarity. The peristome (which is much raised) gives off two arms in front, which meet and unite across the orifice, leaving a circular opening below, within which the avicularium is visible. A similar variety of *Microporella ciliata* Busk has described as *Lepralia personata*, and this name may appropriately be given to corresponding varietal forms. I have already noticed an Australian variety of this species ('Annals,' August 1881), which exhibits the same structure and is also distinguished by its rich purple colour. The present variety may stand as form *personata*, and the latter as form *personata*, var. *purpurea*.

In some cases the characteristic circular avicularium is replaced by one of spatulate figure, and this occasionally assumes gigantic proportions, occupying a large portion of the front of the cell (Pl. IX. fig. 3). In British specimens a large spatulate form is commonly associated with the oœcium, placed transversely at the side of it.

In one instance a colony has occurred (amongst the dredgings from Port Phillip Heads) in which a minute spatulate avicularium takes the place universally of the usual form.

Smittia trispinosa, Johnston, vars. (Pl. IX. figs. 4, 5.)

This species, as represented in the Australian seas, is remarkable for the number and variety of its avicularian

appendages. In an account of some Polyzoa from the coast of Burmah ('Annals' for May 1880) I have noticed a form under the name of var. *bimucronata*, which is distinguished by the lateral elevation of the peristome into mucronate processes, and is also furnished with a very large pointed avicularium, placed on a mound-like rising beside the orifice.

This bimucronate variety also occurs off the coasts of Victoria. Another from the same region (Pl. IX. fig. 4) is also furnished with a mounted lateral appendage, sometimes of moderate, sometimes of gigantic dimensions; but in this case the form is spatulate. Close to the orifice at the side there is also very frequently a small pointed avicularium, with the mandible slanting upwards. In addition there is on many of the cells a minute spatulate appendage unmounted on one side of the mouth.

This seems to be the variety *spatulata* of Smitt, figured in his 'Floridan Bryozoa.'

Yet another form (*munita*) occurs off Port Phillip Heads, in which, on a great proportion of the cells, there is a large rising on one side of the orifice, on which is placed an avicularium with either a broad pointed, or spatulate mandible, or one attenuated and slender towards the extremity, directed downward. A sessile, slender, subspatulate appendage is also present on many of the zoecia. This is a very marked form.

As it occurs in the British seas *S. trispinosa* has usually two modifications of the avicularium—one with a large triangular mandible, very variously placed, the other small and oval in shape, placed laterally.

These variations are interesting morphologically, and especially so in relation to the wide geographical distribution which this species enjoys.

EXPLANATION OF THE PLATES.

PLATE VIII.

- Fig. 1. *Schizoporella subsinuata*, n. sp. 1 a. Avicularium.
 Fig. 2. *Farciminaria uncinata*, n. sp. 2 a. Nat. size. 2 b. Oœcium, viewed sideways. 2 c. The same, front view.
 Fig. 3. *Lepralia bifrons*, n. sp. 3 a. Zoœcium with ovicell and avicularium. 3 b. Orifice of cell without the operculum, showing the large lateral denticles. 3 c. Orifice, with the operculum *in situ*.
 Fig. 4. *Membranipora perfragilis*, MacGillivray (sp.). A group of cells with the avicularium.
 Fig. 5. *Cribrilina monoceros*, MacGillivray. Young cells.

PLATE IX.

- Fig. 1. *Menipea marginata*, n. sp. 1 a. Portion of the stem and branches, magnified, to show the stout habit. 1 b. Part of the margin of the branch, viewed in profile. 1 c. One of the large avicu-

larium on the marginal row of cells. 1 d. The dorsal surface, showing the marginal rib and the way in which the tubular fibres originate.

Fig. 2. *Smittia reticulata*, J. MacGillivray, var. A zoœcium with the avicularium.

Fig. 3'. *Smittia Landsborovi*, Johnston, var. *personata*, n., with the normal circular avicularium showing within the opening in the peristome. 3. The same, with large spatulate avicularium replacing the usual form.

Fig. 4. *Smittia trispinosa*, Johnston, var. *spathulata*, Smitt.

Fig. 5. *Smittia trispinosa*, var. *munita*, n.

Fig. 6. *Porina magnirostris*, MacGillivray (sp.). A young marginal cell, and a mature cell (in outline) with the avicularium.

Fig. 7. *Cyelicopora praelonga*, n. gen. & sp. 7 a. The oœcium.

Fig. 8. *Schizoporella biturrita*, n. sp. 8 a. The orifice.

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Memoirs of the Geological Survey of India. Palæontologia Indica, being Figures and Descriptions of the Organic Remains procured during the progress of the Geological Survey of India. Series x. Indian Tertiary and post-Tertiary Vertebrata. Vol. II. Part 6. Siwalik and Narbada Carnivora. By R. LYDEKKER, B.A., F.G.S., F.Z.S., with 21 plates and 21 woodcuts. Calcutta: Geological Survey Office. London: Trübner & Co. 1884.

THE Carnivora of the Siwalik and Narbada beds form a sumptuous volume of about 180 pages, illustrated with twenty-one plates and the same number of woodcuts. The memoir begins with the Mustelidæ, and gives a statement of the dental characters of the division termed Mustelinæ, comprising the weasels, glutton, badger, and their allies. The group is but poorly represented in a fossil state. In India there are species of the genus *Mellivora*, which has living representatives in India and South Africa, if, indeed, there be any valid distinction between those rats. The *Mellivora sivalensis* was referred to *Ursituurus* by Falconer and Cautley. It is known chiefly from cranial remains from the valley of the Ganges, and is distinct from the living species. *Mellivora punjabiensis* is a new species, founded upon a mandible; it was about the same size as the living and other fossil rats, but had smaller premolar teeth, whereas in *M. sivalensis* the third and fourth premolars are large. Another genus, represented by a single species, is indicated by the *Mellivorodon palvindiensis*. It, too, is described from mandibles. The fragments are very small, but show some interesting characters, differing from *Mellivora* in features which suggest comparison with the glutton; and it has the bluntly trencant talon to the carnassial tooth which is characteristic of gluttons and rats. We then pass on to the otters. The author discusses the generic dental characters of *Lutra*, and enumerates the living species of the Indian region, also the fossil species, which are mostly known from France and Italy. The Indian species are three in number—the *Lutra*